

Individual and community-level factors associated with under-five diarrhea in Bangladesh: Evidence from Demographic and Health Survey 2014

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Abstract

Objective

Diarrheal disease is one of the leading causes of morbidity and mortality among children under five years in Bangladesh. The objective of this study was to assess the prevalence of diarrhea among children under five years and its associated risk factors.

Methods

Data was sourced from the Bangladesh Demographic and Health Survey (BDHS), a nationally representative study conducted in 2014. We used multilevel logistic regression models to identify factors associated with diarrheal disease.

Results

Children aged 6–11 months (OR: 2.26; 95% CI: 1.50 to 3.42), and 12–23 months (OR: 2.31; 95% CI: 1.62 to 3.31) were more likely to have diarrhoea than older children. Other significant risk factors for diarrheal infection included households without access to drinking water (OR: 1.39; 95% CI: 1.03 to 1.88) and mothers lacking mass media access (OR: 1.32; 95% CI: 1.01 to 1.73).

Conclusions

Childhood diarrhoea in Bangladesh was associated with individual and community-level factors. Government and non-government organizations should focus on diarrhea prevention programs such as safe water supply and sanitation, personal hygiene including hand washing, and improved education and access to mass media for mothers of childbearing age.

Introduction

Diarrheal disease is the second leading cause of morbidity and mortality among children under five years old, with an estimated global account of 525,000 annual deaths (1). Developing countries bear the majority of childhood diarrhea burden (1, 2). In 2016, most (~ 90%) childhood diarrhea infections occurred in developing countries in Asia, Africa and Latin America (3). A report in 2014 suggested that more than two-thirds of childhood deaths in developing countries were attributed to diarrheal diseases (4). Indicator 3.2 of the Sustainable Development Goal 3 (SDG 3) aims to reduce under-five mortality rate to < 25 per 1000 live births, while indicator 3.3 aims to eradicate water-borne and other infectious diseases by 2030 (5). Overall, the SDGs aim to reduce disparities in access to healthcare services and ensure good health and wellbeing (5). Identifying disparities in the prevalence of preventable diseases is

critical to inform relevant policies and strategies towards achieving these goals, particularly in developing countries.

Bangladesh has made substantial improvements in most of the indicators of child health over the past few years (6). In Bangladesh, childhood diarrhea was identified as one of the leading causes of death in 2015 (7). According to the United Nations Children's Emergency Fund (UNICEF), the mortality rate among under-five children in Bangladesh has declined from 143 to 30 per 1000 live births during 1990–2018 (8). Both under-five mortality and childhood stunting (low height compared to age) rates had significantly reduced over the last two decades (8, 9). However, trends in the prevalence of childhood diarrhea remained mostly unchanged during the same period (BDHS, 1993–2014). Furthermore, the reduction in childhood diarrhea has not been achieved equally across the various regions of Bangladesh (10) because of difficulties in reaching some of the remote regions and differences in administrative structures.

Several studies assessed the prevalence and identified risk factors of childhood diarrheal diseases at a national, regional, and international level (11–13). Aligning with the Bronfenbrenner's ecological model (14), the potential determinants of under-five diarrheal diseases included individual and community level factors. In Bangladesh, children's access to food and healthcare is suboptimal, which resonates with community level factors, and is often implicated for high childhood morbidities from malnutrition and diarrheal diseases (15–17). Contrastingly, children with better healthcare access and food security, as was found for urban versus rural children (11), are less prone to diarrheal diseases and associated adverse outcomes (11). A recent study in Bangladesh reported substantial variation in the proportion of children suffering from diarrheal episodes across seven large administrative regions administrative regions (18). Other studies have identified that childhood diarrhea was associated with incomplete immunization schedule (19), lack of access to a child health care (20), maternal age (21), maternal religion (22), lack of water for handwashing (23), and mud floors in the household (24). Access to improved sanitation and water is associated with a lower risk of childhood diarrhea worldwide, and this association is more robust in developing countries (25, 26). Apart from that, maternal education was found inversely related to childhood diarrhea risks (17, 27), and so was maternal access to mass media including newspaper, radio and television (17). Mothers who received a soft loan for business and other purposes, had their children suffered less from diarrheal diseases (27). Furthermore, children living in crowded residential conditions tend to have an increased risk of diarrheal diseases (28–30). However, studies that assessed risk factors of childhood diarrhea in Bangladesh commonly used standard logistic regression and/or multivariable regression such as those used in the Bangladesh Demographic and Health Survey (BDHS), Bangladesh data from 2007 to 2011 (6, 28, 31).

This paper shows variation in the prevalence of childhood diarrhea using hierarchical factors such as seven administrative divisions (Barisal, Khulna, Rangpur, Sylhet, Rajshahi, Chittagong and Dhaka), local place of residence (urban and rural areas) and the demographic characteristics of the children. Acknowledging that hierarchical factors may play substantial roles in childhood diarrhoea occurrence, a multilevel approach to statistical modelling potential risk factors is prudent. Therefore, the current study addresses identified knowledge gap in the literature by identifying individual and community level factors

for childhood diarrhoea using a multilevel modelling framework (32, 33). The multilevel technique examines the covariates systematically at different levels of hierarchies that affect the occurrence of childhood diarrhea in Bangladesh. The study was also aimed to inform regional childhood diarrhea prevention policies and formulate regionally tailored guidelines in Bangladesh.

Methods

Source and study population

Bangladesh is a tropical country located in the north-eastern part of South Asia. According to the Population and Housing Census 2011 (PHC), Bangladesh is the most densely populated country in the world (among countries larger than 10,000 square kilometres), and the population of the country is estimated to be about 157.9 million (9). We used data from the BDHS, a nationally representative cross-sectional survey conducted during June – November 2014. The survey was conducted using a two-stage stratified sampling approach. In the first stage, 600 enumeration areas (207 urban vs 393 rural) were selected using probabilities proportional to their size. In the second stage, an average of 30 households was selected from each enumeration area using a systematic random sampling technique. Thus 17,989 residential households were chosen from all divisions in the country. Then, a total of 17,300 households were interviewed, and 18,245 ever-married women aged 15-49 years were identified as eligible participants. Finally, a total of 17,863 ever-married women were interviewed at a response rate of 98% (10). Figure.1 shows the study design and data screening of BDHS 2014.

Study variables and definitions

The outcome variable was the occurrence or non-occurrence of diarrhea among children under five years old, as reported by the child's mother. Diarrhoea was defined as the passage of three or more loose stools in a day in the preceding two weeks during the conduct of the survey. No data on clinical examination were collected.

To identify the risk of diarrhea, we used data at the individual and community levels according to the hierarchical nature of the BDHS data. Individual variables were related to information of the child, their mother (respondent), and the household, while the community variables were related to divisions and place of residence of the respondents. Variables were selected for analysis based on existing literature and contemporary evidence from the study area (6,8,9,11–21,28,31,34–37).

There are almost 700 non-government microcredit organizations in Bangladesh. Microcredit organizations provide small loans to marginalized women in Bangladesh to support entrepreneurship and alleviate poverty (38). In this study, we considered five major microcredit organizations (Grameen Bank, ASA, PROSHIKA, BRAC and BRDB) to assess associations between the memberships of microcredit organizations and the incidence of childhood diarrhoea. Mothers were grouped as those who were and were not a member of any micro-credit organization. Through developing awareness, mothers' access to mass media such as newspapers, radio, and television may help to reduce their children's illness (31). The

original categorization for three variables are set as not at all (0), less than once a week (1), at least once a week (2) and almost every day (3) in DHS study. Therefore mothers were grouped into two levels not having access to any media and having access to at least any one of this media. The DHS data also contains a wealth index score as a proxy for household wealth status, which was generated using principal component analysis, combining variables related to household assets (televisions and bicycles), dwelling characteristics (source of drinking water and sanitation facilities) and construction materials (roof, ceiling, and floor). The details of the calculation of the wealth score are available in the BDHS 2014 (10). Children were classified according to their household wealth levels as: lower (40%), middle (40%), and higher (20%).

The Joint Monitoring Programme (JMP) of WHO/UNICEF categorized the source of drinking water as improved (piped water, tube well or borehole, protected well, protected spring, rainwater and bottled water) and unimproved (unprotected well, unprotected spring, river/irrigation channel, tanker truck, cart with small tank) (39). Similarly, the source of sanitation facilities was classified as improved (flush toilet—flush to the piped sewer system, flush to a septic tank, flush to pit latrine, flush to somewhere else—pit toilet latrine, ventilated improved pit latrine, pit latrine with slab) and unimproved (no facility: bush/field, composting toilet, bucket toilet, pit latrine without a slab, hanging toilet/latrine, and other). The number of adults per living room was used to define household crowding. Households were classified as those with up to two adults (non-crowded or standard) or more than two adults per living room (over-crowded). Household floor material was categorized as “made of mud”, or other. Place of residence was defined as urban and rural areas. Bangladesh is demarcated by the seven administrative divisions or regions where a child is from. The seven divisions were recorded as Barisal, Khulna, Rangpur, Sylhet, Rajshahi, Dhaka, Chittagong.

Statistical analysis

Respondents and their children’s socio-economic and demographic characteristics were descriptively analyzed. Pearson’s chi-squared tests were used to find the association between diarrheal disease among under-five children and their parents’ socio-economic, demographic and community variables. We then performed a multilevel logistic regression analysis to identify the associations of these predictors with diarrheal disease according to the hierarchical nature of the BDHS data (40). Three multilevel models were developed. In model-1, division was considered as the second level; in Model-2, place of residence was considered as the second level; and in Model-3, both division and the place of residence was considered as the third level source of variation. We used Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) to select the best fitting model. All statistical analyses were performed using SPSS 25.0, and the lme4 package of thatistical software, R. In all these analyses, p-value<0.05 was considered statistically significant.

Ethical approval was obtained from the Human Research Ethics Committee (HREC) of the Australian National University (Approval No: 2019/893). The study was also approved by the National Research Ethics Committee (NREC) of the Bangladesh Ministry of Health and Family Welfare.

Results

Maternal and child related characteristics

Table 1 describes maternal and child health related characteristics of participants of this study. A total of 7,760 mothers with their children between the ages of 0 and 59 months were included in this study. More than half (56%) of mothers have attended secondary or higher level of education, 60% of mothers had access to mass media, and 23% of them were members in microcredit programs. About 22.2% of mothers were classified as high socioeconomic status, 34.3% as middle, and 41.5% as low. Pertaining to children: 52% were female, and 60% were living in households with a floor made of mud. Over 19% of children belonged to households without access to improved water facilities, and 67% were from households with unimproved sanitation facilities. Only 14% of children were fully vaccinated, but 9% of them had a certificate of completion.

Community level characteristics of participants

The majority of participants (74%) of this study were selected from rural areas of Bangladesh, and the remaining (26%) were from urban areas of the country. Study participants were selected from different regions/divisions of the country such as 5.7% were from Barisal division, 7.5% from Khulna, 9.9% were from Rangpur, 9.9% were from Sylhet, 10.3% were from Rajshahi, 21.5% Chittagong, and 35.2% were from Dhaka division. Figure 1 shows the map of the study area and its divisions.

Prevalence of diarrhea across different individual and community level factors

The overall prevalence of diarrhea among under five children was 5.7% in Bangladesh. The prevalence of diarrhea was almost similar between male and female children; however, higher prevalence of diarrhea was observed among children between the ages of 12 and 24 months (8.5%) and in children without health card (7.1%). Moreover, higher prevalence of child diarrhea was reported among children of mothers who were uneducated (6.1%), young (15-19 years) (6.3%), had not access to media (6.4%), lack of sanitation facilities (6.2%), and low socioeconomic status (6.0%). The highest prevalence of diarrhea was observed in Chittagong, followed by the divisions of Dhaka and Sylhet. Overall, children from Chittagong (6.7%), Dhaka (6.5%), Barisal (6.5%) and Sylhet (6.1%) divisions were more likely to suffer from diarrhea than children from Rangpur (2.7%), Khulna (3.6%) and Rajshahi (4.3%) divisions ($p < 0.05$) (Table 1).

The association between individual and community level factors with the prevalence of diarrhea among under five children

Table two presented the results of multilevel logistic regression analysis including adjusted odds ratios (ORs) and 95% confidence intervals. Model-I was adjusted for individual-level explanatory variables and division as a community-level variable; Model-II was adjusted for individual-level variables and place of residence as community-level variables; and Model-III was adjusted individual-level variables; and division and place of residence as community-level variables. Considering BIC, Model-II and Model-III performed

equally well. As Model-III was simpler in the sense that the model has fewer parameters, we will use outputs of this model as our main analysis, noting that odds ratios for the three models are similar throughout. Accordingly, the age of the child, mother's access to mass media and source of drinking water were associated with childhood diarrhea. The odds of diarrhea also changed with the age group of the child, with higher odds in the younger age groups of 6 – 11 months (AOR=2.34, 95% CI=1.55, 3.54) and 12–23 months (OR=2.38, 95% CI=1.66, 3.41). The odds of diarrheal infection in children whose mothers did not have access to media were elevated (AOR=1.32, 95% CI=1.01, 1.73), as were those of children who lived in households with an unimproved water source (AOR=1.39, 95% CI=1.03, 1.88).

Discussion

This study identified a high prevalence of diarrhea among under five children in Bangladesh. The highest prevalence of diarrhea was observed in Chittagong division, followed by divisions of Dhaka and Sylhet. The previous study in Bangladesh also found that the prevalence of diarrhea was significantly higher in Chittagong division (11) and lower in Rangpur (41). This could be due to Chittagong is a major port city and riverine area that is prone to floods and natural disasters, which increases the risk of diarrheal diseases (41). Whereas the increased prevalence of diarrhea in Dhaka might be related to the high population density, heavy traffic, seasonal floods, natural hazards and a high number of slum dwellers (42). Moreover, this prevalence was higher than studies findings from Pakistan, Nepal, India, and China. This could be due to the socioeconomic and health system difference between the countries (43, 44).

This study revealed that children below the age of two have higher chance of diarrhea than children above two years of age. This finding is consistent with national and international study findings (28, 37, 45–47). Children at this age are often exposed to a wide range of individual and environmental factors that cause diarrheal disease while start weaning, crawling, and exploring environment (48). In this transition period children might be exposed to unhygienic feeding practices, impure water, unhygienic utensils and unhealthy environments consumption of food containing pathogens that cause diarrhoea (49, 50). Previous studies have reported that pathogens such as enterotoxigenic *Escherichia coli* are the common causes of diarrhea among young children (51, 52). Exclusive breastfeeding for the first six months of the child's life and continuation of breast feeding until two years in addition to appropriate weaning process starting from liquid/fluid foods to semisolid and solid foods are vital to decrease incidences of diarrhea in this age group (53). Besides, targeted dietary supplementation are essential to aid the development of children's immune systems (54).

Mothers' access to the mass media was significantly associated with reduced prevalence of diarrhea among under five children. This finding is inline with of previous studies that access to information was associated with lower level of diarrhea in children (31, 55). This is due to mass medias are able to create awareness and reach to remote areas of the country. Increasing access to information through mass medias and other forms can raise awareness and decrease the prevalence of diarrhea especially in rural and less advantaged portions of the population. This because when people are exposed to information they can easily adopt the recommended practices.

Consistent with other studies in Bangladesh, we found that the provision of an improved sanitation facilities reduced the prevalence of childhood diarrhea among under five children (11, 18). The same finding is also reported in previous research that the improvement of both water and sanitation facilities were associated with a reduced risk of diarrheal disease (56). This is because most of the common cause of diarrheal illnesses in under-five children are hygiene related in the preparation and serving of foods to children. Thus, sanitation facilities such as improved latrines and hand hygiene can decrease the transmission of bacterial pathogens between children and the environment (57).

Overall, this study used the most recent nationally representative survey in the country. Information related to child diarrhea were provided by the mothers; thus, there might be some inaccurate information in the absence of clinical data and inherent recall bias. Some missing information were observed in some variables, such as duration of breastfeeding, size of child at birth and antenatal visits, and these variables were not included in the model.

Conclusions

The study showed that individual and community-level factors substantially contribute to the high prevalence of diarrhea among under five children in Bangladesh. The prevalence of diarrhea was higher among young children less than two years old, and in children of mothers without sanitation facilities and had not access to information/media. The result of this study suggests health workers, community leaders, division health offices, and the government to apply an integrated preventive interventions and mass media awareness targeted to young children and unaccessed rural areas to target less privileged and rural illiterate mothers to increase access to education and mass media. Policymakers should focus on intervention programs to improve sanitation facilities and increase the awareness of the community about diarrheal illnesses and preventions through available medias in the country. We also recommend future researchers to investigate the effect of access to information and sanitation services through prospective and randomized control designs to best recommend the effect of these variables on diarrheal incidences among under five children.

Declarations

Ethics approval and consent to participant

This study was conducted in line with the Helsinki Declaration. The study was based on publicly accessible DHS data, and ethics approval was not needed. This research was considered exempt by the Australian National University Human Research Ethics Committee (Approval No: 2019/893). Besides, the data was accessed from the DHS website (<https://dhsprogram.com>)

Consent for publication

Not applicable

Availability of data and materials

The data is publically available (Demographic and Health Survey, Bangladesh) based on a request.

Competing interests

The authors declare no competing interest.

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Authors' contributions

MMK designed the study, analysed and interpreted the data, and drafted the manuscript for submission. TT, TT and SZH analyzed and interpreted data, and drafted the manuscript. All authors reviewed and approved the manuscript.

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Tables

Table.1 Descriptive analysis and bivariate results (chi-squared tests) of the childhood diarrhoea in Bangladesh, BDHS 2014.

Variables		Number (n=7760)	Percentage (%)	Prevalence (%) (95% CI)
Overall				5.7 (5.2 to 6.2)
Individual-level characteristics				
Age of child (months)***	0 -5	657	8.5	5.9 (4.1 to 7.7)
	6 -11	857	11.0	6.7 (5.0 to 8.4)
	12 - 23	1633	21.0	8.5 (7.2 to 9.9)
	24 -35	1563	20.1	5.1 (4.0 to 6.2)
	36 -47	1535	19.8	4.0 (3.0 to 5.0)
	48 -59	1515	19.5	4.3 (3.3 to 5.3)
Sex	Male	4051	52.2	5.7 (5.0 to 6.4)
	Female	3710	47.8	5.6 (4.9 to 6.3)
Immunization status***	Incomplete	6671	86.0	4.5 (4.0 to 5.0)
	Complete	1089	14.0	8.1 (6.5 to 9.7)
Child health card**	No	659	8.5	7.1 (5.1 to 9.1)
	Yes	7102	91.5	5.1 (4.6 to 5.7)
Mother's age (years)	15-19	1135	14.6	6.3 (4.9 to 7.8)
	20-29	4789	61.7	5.6 (5.0 to 6.2)
	30-49	1836	23.7	5.6 (4.6 to 6.7)
Mother's education**	Non-formal	3435	44.3	6.1 (5.3 to 6.9)
	education/primary	4325	55.7	5.3 (4.6 to 6.0)
	Secondary or higher			
Mother's access to mass media**	No access	3000	38.7	6.4 (5.5 to 7.9)
	Access	4761	61.3	5.2 (4.6 to 5.8)
Mother's microcredit membership**	Not a member	5990	77.2	5.4 (4.8 to 6.0)
	Member	1770	22.8	6.6 (5.4 to 7.8)
Mother's religion	Others	137	1.8	5.1 (1.4 to 8.8)
	Hindus	520	6.7	5.8 (4.0 to 7.8)
	Muslim	7104	91.5	5.7 (1.8 to 9.6)
Drinking water source	Unimproved	1540	19.8	6.0 (4.8 to 7.2)
	Improved	6221	80.2	5.6 (5.0 to 6.2)
Washing facility	No	1860	24.0	5.5 (4.5 to 6.5)
	Yes	5901	76.0	5.7 (5.1 to 6.3)
Sanitation facility***	Unimproved	5202	67.0	6.2 (5.5 to 6.9)
	Improved	2558	33.0	4.7 (3.9 to 5.5)
Number of adults per room	More than two adults	5395	69.5	5.8 (5.2 to 6.4)
	Up to two adults	2366	30.5	5.4 (4.5 to 6.3)
Household floor material	Not mud	2905	37.4	5.2 (4.4 to 6.0)

	Mud	4855	62.6	6.0 (5.3 to 6.7)
Socioeconomic status	Low	3221	41.5	6.0 (5.2 to 6.8)
	Middle	2819	36.3	5.6 (4.8 to 6.5)
	High	1720	22.2	5.2 (4.2 to 6.3)
Community-level characteristics Division ***	Barisal	444	5.7	6.5 (4.2 to 8.8)
	Khulna	580	7.5	3.6 (2.1 to 5.1)
	Rangpur	768	9.9	2.7 (1.6 to 3.9)
	Sylhet	771	9.9	6.1 (4.4 to 7.8)
	Rajshahi	797	10.3	4.3 (2.9 to 5.7)
	Chittagong	1668	21.5	6.7 (5.5 to 7.9)
	Dhaka	2733	35.2	6.5 (5.6 to 7.4)
Place of residence	Rural	5777	74.2	5.7 (5.1 to 6.3)
	Urban	1984	25.6	5.6 (4.6 to 6.6)

CI: Confidence interval and **p<0.05 and ***p<0.001

Source: BDSH 2014 data

Table.2 Multilevel logistic regression for the childhood diarrhoea in Bangladesh, BDHS 2014.

Variables	Model-I^a AOR^d (95% CI^e)	Model-II^b AOR (95% CI)	Model-III^c AOR (95% CI)
Individual-level characteristics			
Age of child (months)			
0 -5	1.07 (0.63-1.84)	1.07 (0.63-1.84)	1.07 (0.63-1.83)
6 -11	2.26 (1.50-3.41)***	2.27 (1.50-3.42)***	2.26 (1.50-3.42)***
12 - 23			
24 -35	2.31 (1.61-3.30)***	2.31 (1.62-3.31)***	2.31 (1.62-3.31)***
36 -47			
48 -59 (RC)	1.25 (0.81-1.85)	1.26 (0.85-1.85)	1.26 (0.85-1.85)
	1.22 (0.83-1.80)	1.23 (0.83-1.81)	1.23 (0.83-1.81)
	1.00	1.00	1.00
Child gender			
Female	0.85 (0.69- 1.05)	0.85 (0.69-1.05)	0.85 (0.69-1.05)
Male (RC)	1.00	1.00	1.00
Child immunization			
Incomplete	0.97 (0.71-1.32)	0.96 (0.71-1.31)	0.96 (0.7-1.31)
Complete (RC)	1.00	1.00	1.00
Child health card			
No	0.94 (0.63-1.43)	0.97 (0.65-1.46)	0.97 (0.65-1.45)
Yes (RC)	1.00	1.00	1.00
Mother's age (years)			
15-19	1.31 (0.91-1.90)	1.29 (0.89-1.86)	1.29 (0.89-1.87)
20-29	1.23 (0.93-1.62)	1.22 (0.9-1.61)	1.22 (0.93-1.61)
30-49 (RC)	1.00	1.00	1.00
Mother's education			
No formal education/primary	1.23 (0.97-1.57)	1.24 (0.98-1.58)	1.25 (0.98-1.58)
Secondary or higher (RC)	1.00	1.00	1.00
Mother's access to mass media			
No access	1.32(1.01-1.73)**	1.33 (1.0-1.75)**	1.32 (1.01-1.73)**
Access (RC)	1.00	1.00	1.00
Mother's microcredit membership			
Not a member	0.91 (0.70-1.18)	0.93 (0.71 to 1.21)	0.93 (0.71-1.21)
Member (RC)	1.00	1.00	1.00
Mother's religion			
Others	0.73 (0.22-2.41)	0.77 (0.23-2.52)	0.76 (0.23-2.51)
Hindus	1.05 (0.70-1.60)	1.03 (0.68-1.56)	1.03 (0.68-1.57)

Muslim (RC)		1.00	1.00
Drinking water source			
Unimproved	1.37 (1.01-	1.38 (1.02	1.39 (1.0-1.88)**
Improved (RC)	1.86)**	-1.88)***	1.00
	1.00	1.00	
Washing facility			
Yes	0.94 (0.54-1.63)	0.92 (0.53-1.59)	0.92 (0.53-1.60)
No (RC)	1.00	1.00	1.00
Sanitation facility availability			
Improved	0.94 (0.68-1.30)	0.95 (0.69-1.31)	0.94 (0.68-1.30)
Unimproved (RC)	1.00	1.00	1.00
Number of adults per room			
More than two adults	1.11 (0.87-1.42)	1.08 (0.85-1.38)	1.08 (0.85-1.39)
Up to two adults (RC)	1.00	1.00	1.00
Household floor material			
Not mud	0.91 (0.63-1.31)	0.90 (0.62-1.30)	0.90 (0.6-1.30)
Mud (RC)	1.00	1.00	1.00
Socioeconomic status			
Low	0.85 (0.48-1.52)	0.85 (0.5-1.28)	0.84 (0.47-1.50)
Middle	0.86 (0.57-1.29)	0.84 (0.4-1.51)	0.85 (0.56-1.27)
High (RC)	1.00	1.00	1.00
Community-level variables			
Place of residence			
Rural		0.96 (0.74-1.24)	
Urban (RC)		1.00	
Division			
Barisal	1.18 (0.80-1.75)		
Khulna	0.71 (0.45-1.12)		
Rangpur	0.52 (0.32-		
Sylhet	0.85)**		
Rajshahi	1.13 (0.79-1.63)		
Chittagong	0.84 (0.55-1.28)		
Dhaka (RC)	1.39 (1.00-		
	1.95)**		
	1.00		
AIC^f	2944.7	2951.1	2951.1
BIC^g	3131.8	3103.6	3103.6

RC: Reference Category

Model-I^a - Adjusted for individual and community level (division); Model-II^b: Adjusted for individual and community level (place of residence); Model-III^c: Adjusted for individual and community levels (division and place of residence)

AOR^d-Adjusted Odds Ratio and CI^e-Confidence Interval; AIC^f-Akaike Information Criterion; BIC^g- Bayesian Information Criterion; **p<0.05 and ***p<0.001;

Figures

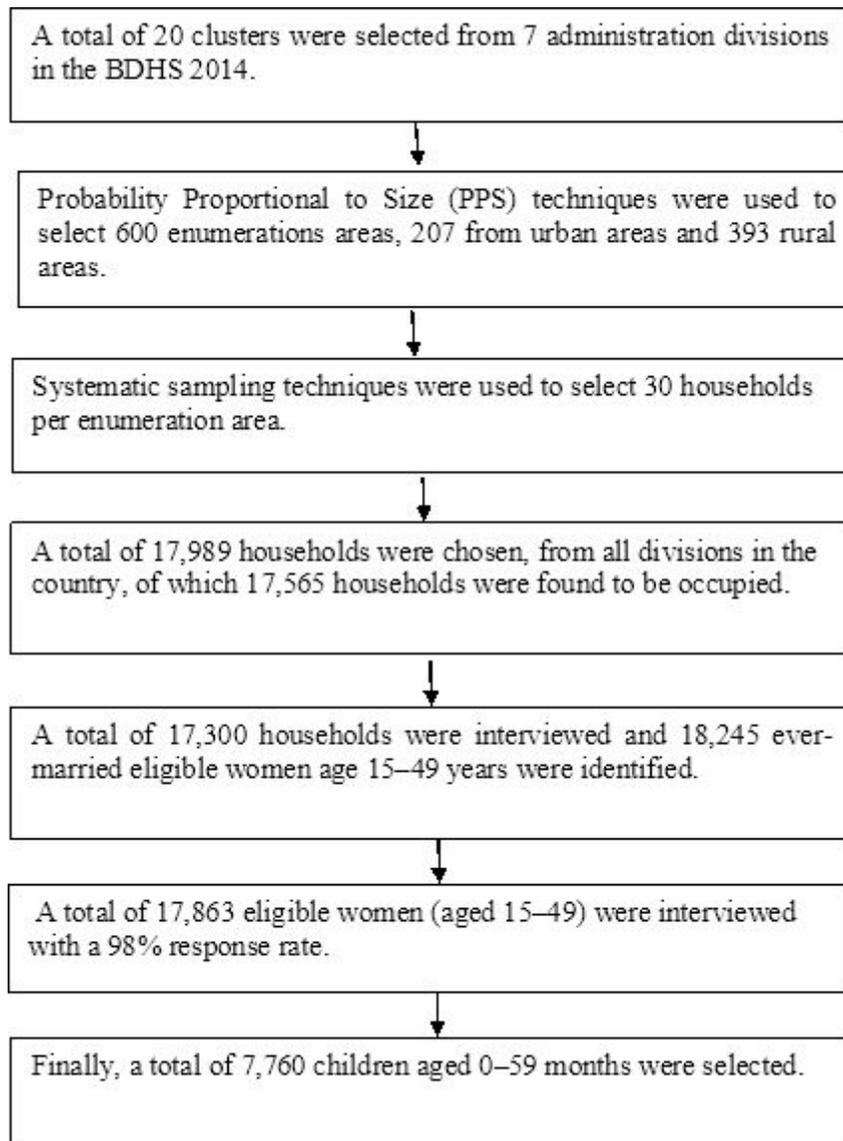


Figure 1

Study design and data screening within Bangladesh Demographic and Health Survey, 2014.